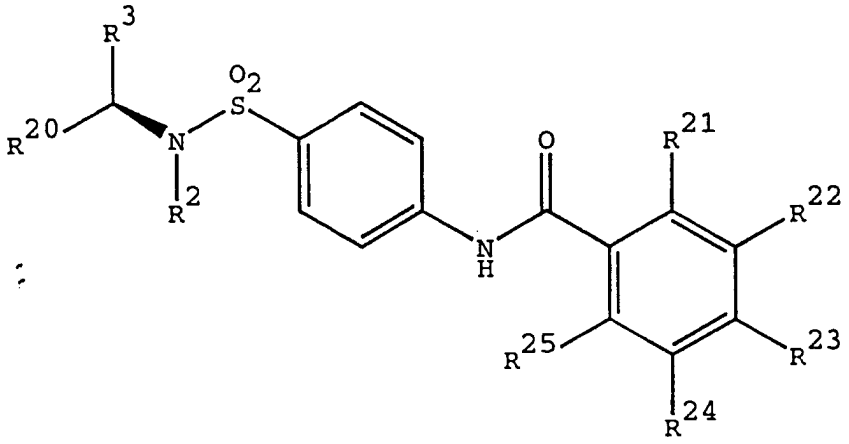
CLAIMS

What is claimed is:

1. A matrix metalloproteinase inhibiting compound having the structure:



or a salt, an enantiomer, a diastereomer, a racemate, or a tautomer thereof, wherein:

R^2 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, heterocycloalkyl, and heterocycloalkylalkyl;

R^3 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, haloalkoxy, haloalkylthio, and heterocycloalkyl;

R^{20} is selected from the group consisting of -C(O)OH, -C(O)NHOH, -SH, and -C(O)SH; and

R^{21}, R^{22}, R^{23}, R^{24}, and R^{25} are independently selected from the group consisting of H, C_1 to about C_{20} alkyl, C_1 to about C_{20} alkenyl, C_1 to about C_{20} alkynyl, cycloalkyl, haloalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl,

alkylaminoalkyl, nitroalkyl, heterocycloalkyl, alkoxy, cycloalkoxy, alkoxycarbonyl, alkoxyalkyl, haloalkoxy, haloalkylthio, alkylamino, and carboxyalkyl.

2. The matrix metalloproteinase inhibiting compound of claim 1 wherein R^{20} is selected from the group consisting of -C(O)OH and -C(O)NHOH.

3. The matrix metalloproteinase inhibiting compound of claim 2 wherein R^{21} and R^{25} are H.

4. The matrix metalloproteinase inhibiting compound of claim 3 wherein R^{22} and R^{24} are H.

5. The matrix metalloproteinase inhibiting compound of claim 4 wherein R^{23} is C_1 to about C_{20} alkyl.

6. The matrix metalloproteinase inhibiting compound of claim 5 wherein R^{23} is C_1 to about C_{20} linear alkyl.

7. The matrix metalloproteinase inhibiting compound of claim 2 wherein R^{20} is -C(O)OH.

8. The matrix metalloproteinase inhibiting compound of claim 7 wherein R^3 is selected from the group consisting of alkyl, alkenyl, alkynyl, haloalkoxy, haloalkylthio, and heterocycloalkyl.

9. The matrix metalloproteinase inhibiting compound of claim 8 wherein R^3 is heterocycloalkyl.

10. The matrix metalloproteinase inhibiting compound of claim 9 wherein R^3 is 2-(N-morpholino)ethyl.

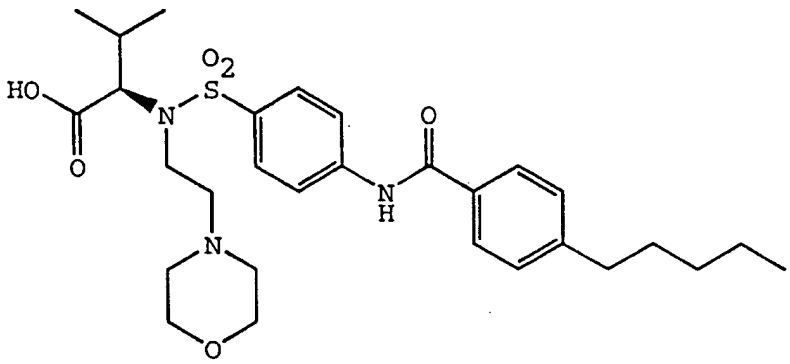
11. The matrix metalloproteinase inhibiting compound of claim 2 wherein R^{20} is -C(O)NHOH.

12. The matrix metalloproteinase inhibiting compound of claim 11 wherein R^3 is selected from the group consisting of alkyl, alkenyl, alkynyl, haloalkoxy, haloalkylthio, and heterocycloalkyl.

13. The matrix metalloproteinase inhibiting compound of claim 12 wherein R^3 is heterocycloalkyl.

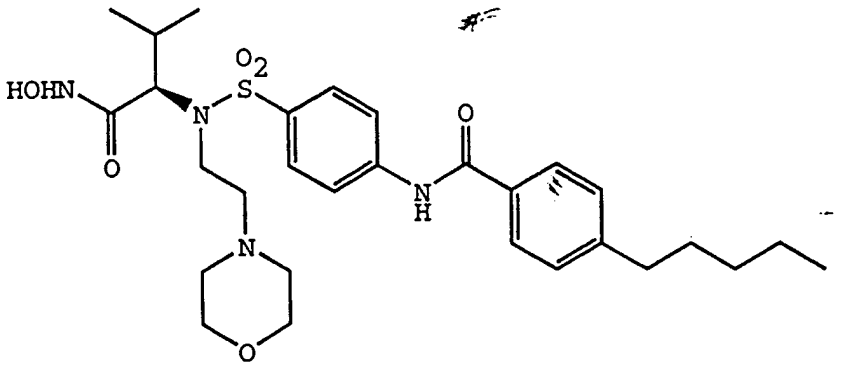
14. The matrix metalloproteinase inhibiting compound of claim 13 wherein R^3 is 2-(N-morpholino)ethyl.

15. The matrix metalloproteinase inhibiting compound of claim 14 having the structure



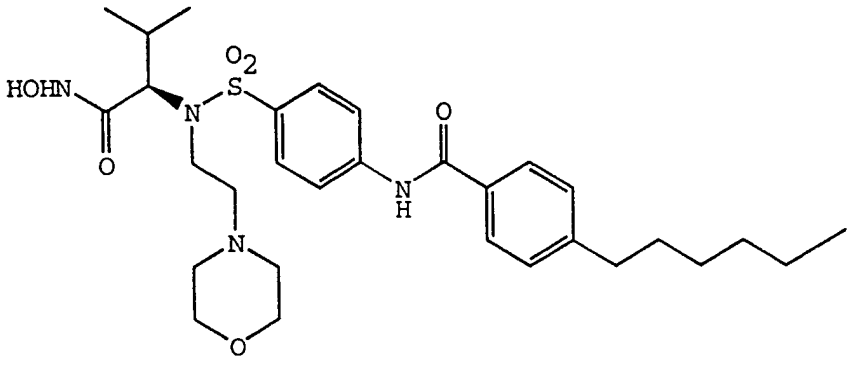
or a salt, an enantiomer, a racemate, or a tautomer thereof.

16. The matrix metalloproteinase inhibiting compound of claim 14 having the structure



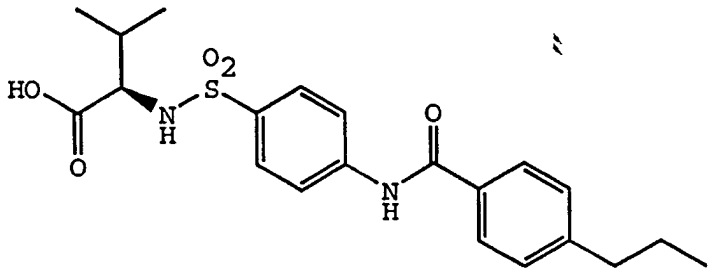
or a salt, an enantiomer, a racemate, or a tautomer thereof.

17. The matrix metalloproteinase inhibiting compound of claim 14 having the structure



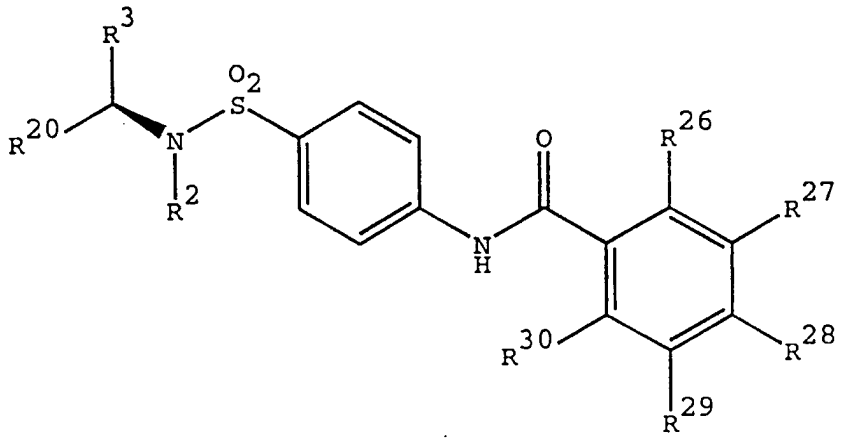
or a salt, an enantiomer, a racemate, or a tautomer thereof.

18. The matrix metalloproteinase inhibiting compound of claim 14 having the structure



or a salt, an enantiomer, a racemate, or a tautomer thereof.

19. A method of changing the conformation of a matrix metalloproteinase wherein the method comprises contacting the matrix metalloproteinase with a compound having the formula:



or a salt, an enantiomer, a diastereomer, a racemate, or a tautomer thereof, thereby changing the conformation of the matrix metalloproteinase, wherein:

R^2 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl,

alkylaryl, arylalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, heterocycloalkyl, and heterocycloalkylalkyl;

R^3 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, haloalkoxy, haloalkylthio, and heterocycloalkyl;

R^{20} is selected from the group consisting of -C(O)OH, -C(O)NHOH, -SH, and -C(O)SH; and

R^{26}, R^{27}, R^{28}, R^{29}, and R^{30} are independently selected from the group consisting of about C_3 to about C_{20} alkyl, about C_3 to about C_{20} alkenyl, about C_3 to about C_{20} alkynyl, cycloalkyl, haloalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, nitroalkyl, heterocycloalkyl, alkoxy, cycloalkoxy, alkoxycarbonyl, alkoxyalkyl, haloalkoxy, haloalkylthio, alkylamino, and carboxyalkyl.

20. The method of claim 19 wherein R^{20} is selected from the group consisting of -C(O)OH and -C(O)NHOH.

21. The method of claim 19 wherein R^3 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkoxy, haloalkylthio, and heterocycloalkyl

22. The method of claim 21 wherein R^3 is a C_1 to about C_{12} alkyl.

23. The method of claim 22 wherein R^3 is a C_1 to about C_4 alkyl.

24. The method of claim 23 wherein R^3 is isopropyl.

25. The method of claim 19 wherein R^2 is heterocycloalkylalkyl.

26. The method of claim 25 wherein R^2 is 2-(N-morpholino)ethyl.

27. The method of claim 19 wherein R^{26} and R^{30} are H.

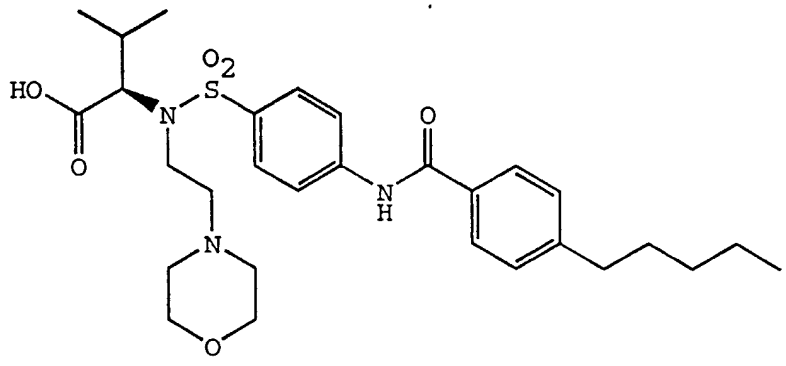
28. The method of claim 27 wherein R^{27} and R^{29} are H.

29. The method of claim 28 wherein R^{28} is about C_3 to about C_{20} alkyl.

30. The method of claim 29 wherein R^{28} is about C_3 to about C_{20} linear alkyl.

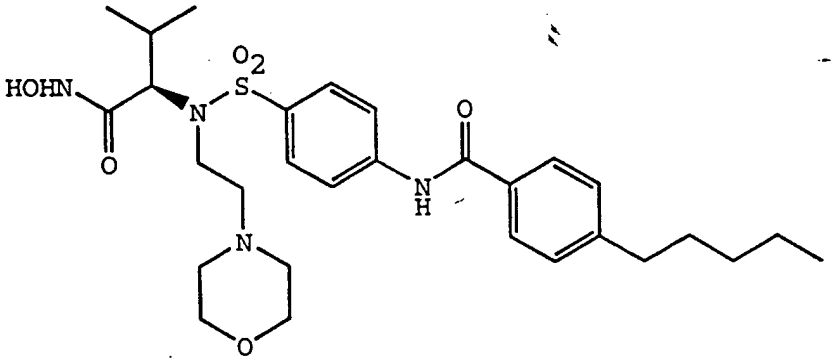
31. The method of claim 30 wherein R^{28} is selected from the group consisting of n-propyl, n-butyl, n-pentyl and n-hexyl.

32. The method of claim 31 wherein the compound has the structure:



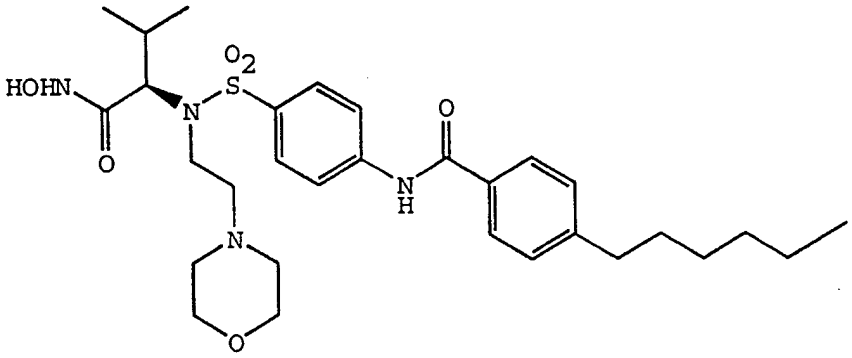
or a salt, an enantiomer, a racemate, or a tautomer thereof.

33. The method of claim 31 wherein the compound has the structure:



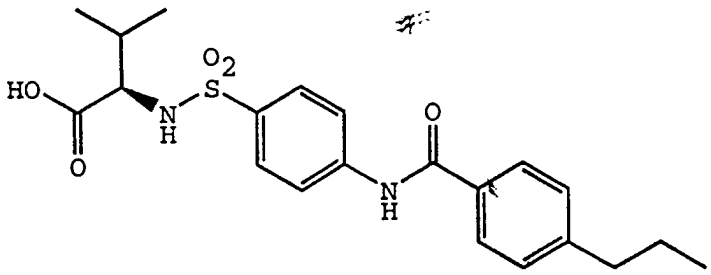
or a salt, an enantiomer, a racemate, or a tautomer thereof.

34. The method of claim 31 wherein the compound has the structure:



or a salt, an enantiomer, a racemate, or a tautomer thereof.

35. The method of claim 31 wherein the compound has the structure:



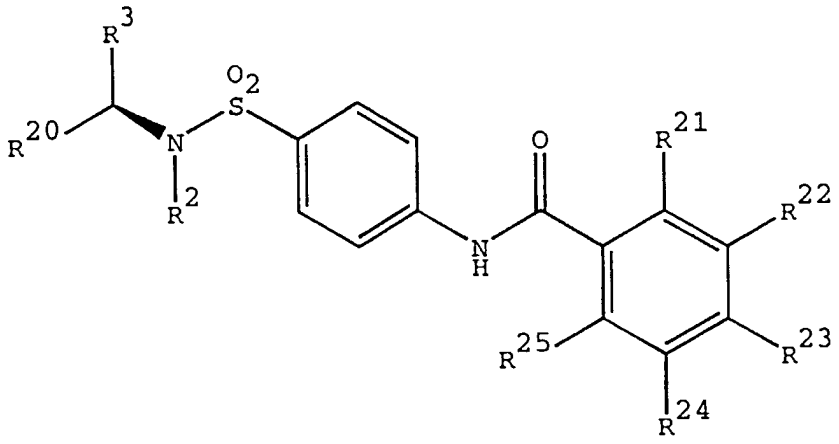
or a salt, an enantiomer, a racemate, or a tautomer thereof.

36. The method of claim 19 wherein the matrix metalloproteinase is selected from the group consisting of MMP-8 and MMP-13.

37. The method of claim 36 wherein the matrix metalloproteinase is MMP-8.

38. The method of claim 36 wherein the matrix metalloproteinase is MMP-13.

39. A method of inhibiting a matrix metalloproteinase wherein the method comprises contacting the matrix metalloproteinase with a compound having the formula:



or a salt, an enantiomer, a diastereomer, a racemate, or a tautomer thereof, thereby inhibiting the matrix metalloproteinase, wherein:

R^2 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, heterocycloalkyl, and heterocycloalkylalkyl;

R^3 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, haloalkoxy, haloalkylthio, and heterocycloalkyl;

R^{20} is selected from the group consisting of -C(O)OH, -C(O)NHOH, -SH, and -C(O)SH; and

R^{21}, R^{22}, R^{23}, R^{24}, and R^{25} are independently selected from the group consisting of H, C_1 to about C_{20} alkyl, C_1 to about C_{20} alkenyl, C_1 to about C_{20} alkynyl, cycloalkyl, haloalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, nitroalkyl, heterocycloalkyl, alkoxy, cycloalkoxy, alkoxycarbonyl, alkoxyalkyl, haloalkoxy, haloalkylthio, alkylamino, and carboxyalkyl.

40. The method of claim 39 wherein R^{20} is selected from the group consisting of -C(O)OH and -C(O)NHOH.

41. The method of claim 39 wherein R^3 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkoxy, haloalkylthio, and heterocycloalkyl.

42. The method of claim 41 wherein R^3 is a C_1 to about C_{12} alkyl.

43. The method of claim 42 wherein R^3 is a C_1 to about C_4 alkyl.

44. The method of claim 43 wherein R^3 is isopropyl.

45. The method of claim 39 wherein R^2 is heterocycloalkylalkyl.

46. The method of claim 45 wherein R^2 is 2-(N-morpholino)ethyl.

47. The method of claim 39 wherein R^{21} and R^{25} are H.

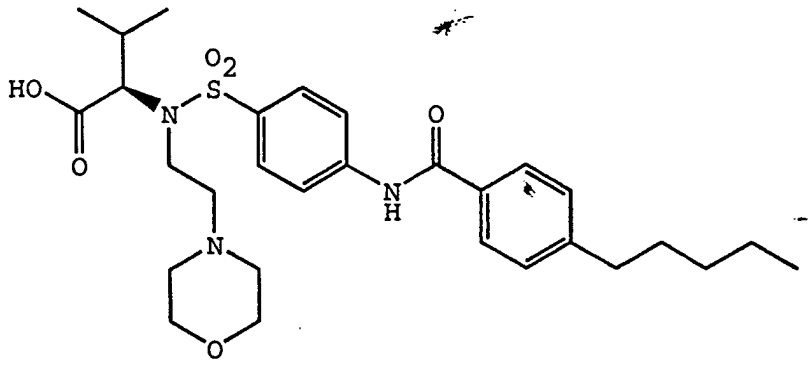
48. The method of claim 47 wherein R^{22} and R^{24} are H.

49. The method of claim 48 wherein R^{23} is C_1 to about C_{20} alkyl.

50. The method of claim 49 wherein R^{23} is methyl or C_2 to about C_{20} linear alkyl.

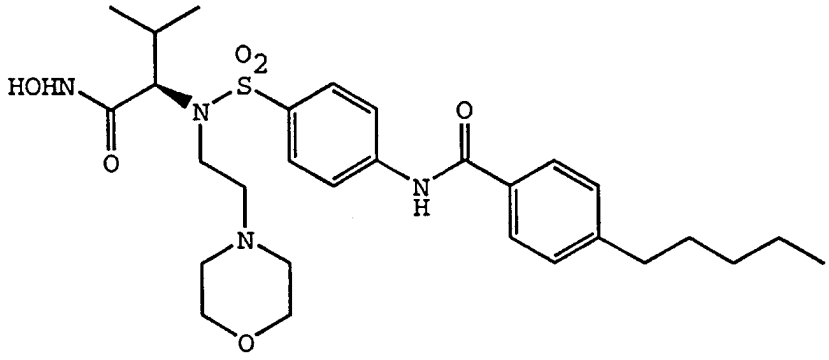
51. The method of claim 50 wherein R^{23} is n-pentyl or n-hexyl.

52. The method of claim 51 wherein the compound has the structure:



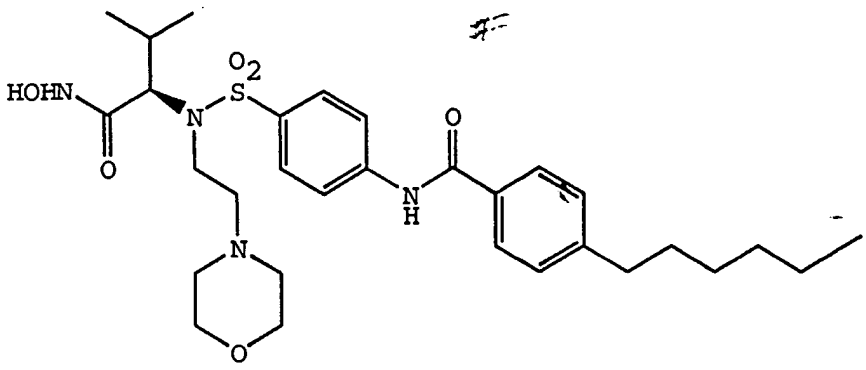
or a salt, an enantiomer, a racemate, or a tautomer thereof.

53. The method of claim 51 wherein the compound has the structure:



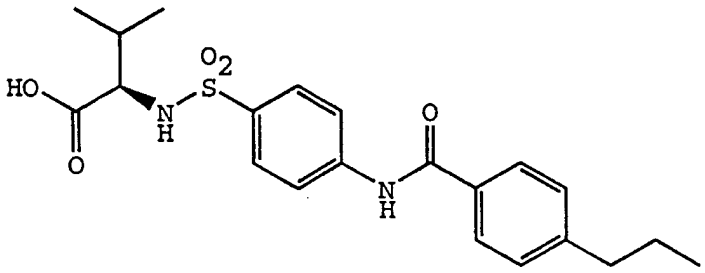
or a salt, an enantiomer, a racemate, or a tautomer thereof.

54. The method of claim 51 wherein the compound has the structure:



or a salt, an enantiomer, a racemate, or a tautomer thereof.

55. The method of claim 51 wherein the compound has the structure:



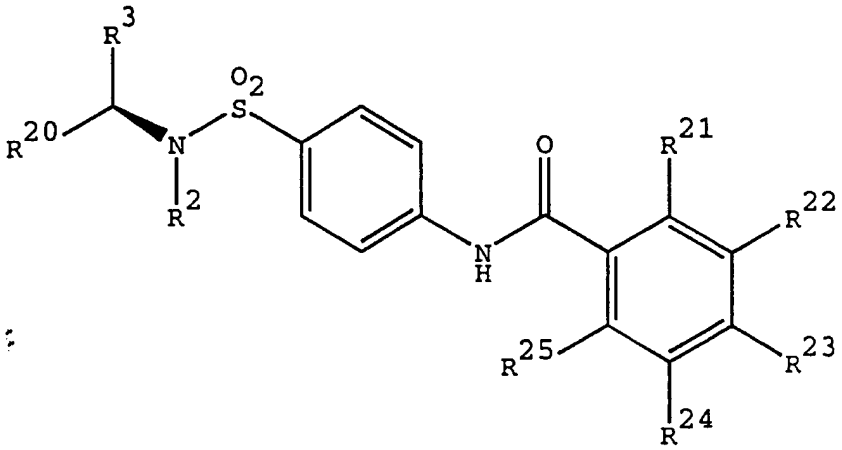
or a salt, an enantiomer, a racemate, or a tautomer thereof.

56. The method of claim 39 wherein the matrix metalloproteinase is selected from the group consisting of MMP-8 and MMP-13.

57. The method of claim 56 wherein the matrix metalloproteinase is MMP-8.

58. The method of claim 56 wherein the matrix metalloproteinase is MMP-13.

59. A method treating osteoarthritis in a mammal wherein the method comprises providing to the mammal an osteoarthritis-treating-effective amount of a compound having the formula:



or an enantiomer, diastereomer, racemate, or tautomer thereof, thereby treating osteoarthritis, wherein:

R^2 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, heterocycloalkyl, and heterocycloalkylalkyl;

R^3 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, hydroxyalkyl, aminoalkyl, alkylaminoalkyl, haloalkoxy, haloalkylthio, and heterocycloalkyl;

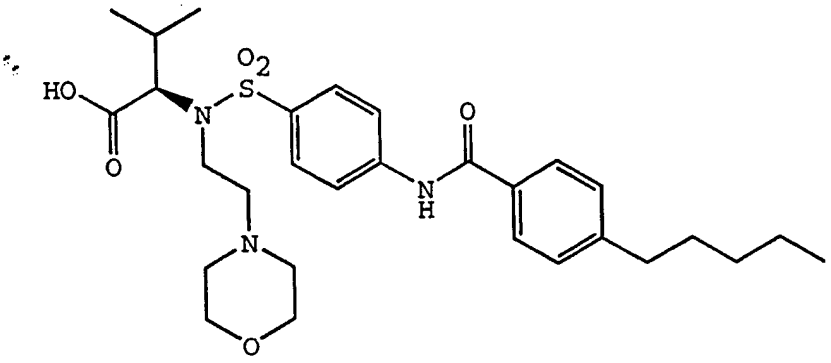
R^{20} is selected from the group consisting of -C(O)OH, -C(O)NHOH, -SH, and -C(O)SH; and

R^{21}, R^{22}, R^{23}, R^{24}, and R^{25} are independently selected from the group consisting of H, C_1 to about C_{20} alkyl, C_1 to about C_{20} alkenyl, C_1 to about C_{20} alkynyl, cycloalkyl, haloalkyl, alkoxyalkyl, hydroxyalkyl, aminoalkyl,

alkylaminoalkyl, nitroalkyl, heterocycloalkyl, alkoxy, cycloalkoxy, alkoxycarbonyl, alkoxyalkyl, haloalkoxy, haloalkylthio, alkylamino, and carboxyalkyl.

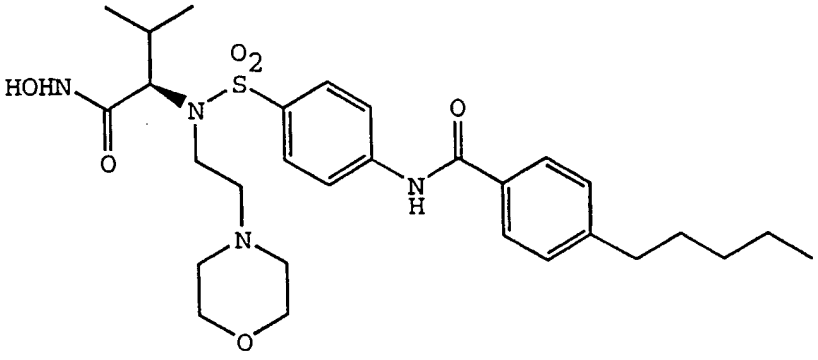
60. The method of claim 59 wherein the mammal is a human.

61. The method of claim 60 wherein the compound has the structure:



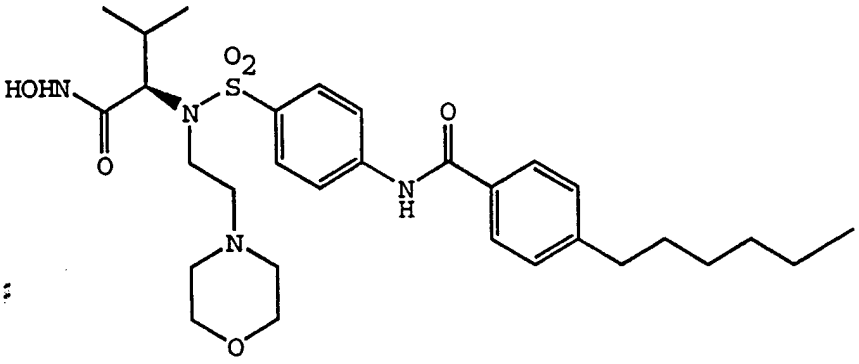
or a salt, an enantiomer, a racemate, or a tautomer thereof.

62. The method of claim 60 wherein the compound has the structure:



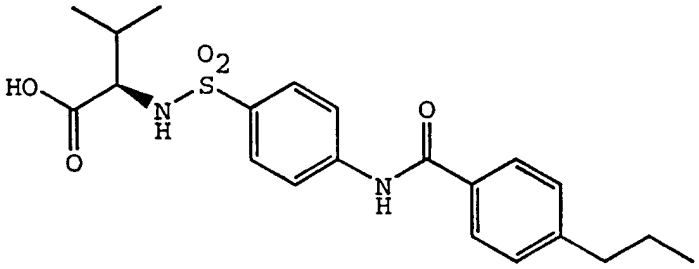
or a salt, an enantiomer, a racemate, or a tautomer thereof.

63. The method of claim 60 wherein the compound has the structure:



or a salt, an enantiomer, a racemate, or a tautomer thereof.

64. The method of claim 60 wherein the compound has the structure:



or a salt, an enantiomer, a racemate, or a tautomer thereof.